

# actron

## owners manual

### ENGINE ANALYZER

MODEL 615

FOR 12 VOLT IGNITION SYSTEMS



### IMPORTANT

The information in this manual will serve as a general guide for engine tune-up and charging system tests and adjustments.

CONSULT THE OWNERS MANUAL OF THE VEHICLE BEING TESTED FOR SPECIFIC TUNE-UP INFORMATION AND TEST PROCEDURES. THE MANUFACTURER'S SPECIFICATIONS AND TEST PROCEDURE FOR ADJUSTING DWELL ANGLE, IDLE SPEED AND CHARGING SYSTEM OUTPUT SHOULD BE FOLLOWED.

### FOR SAFE OPERATION

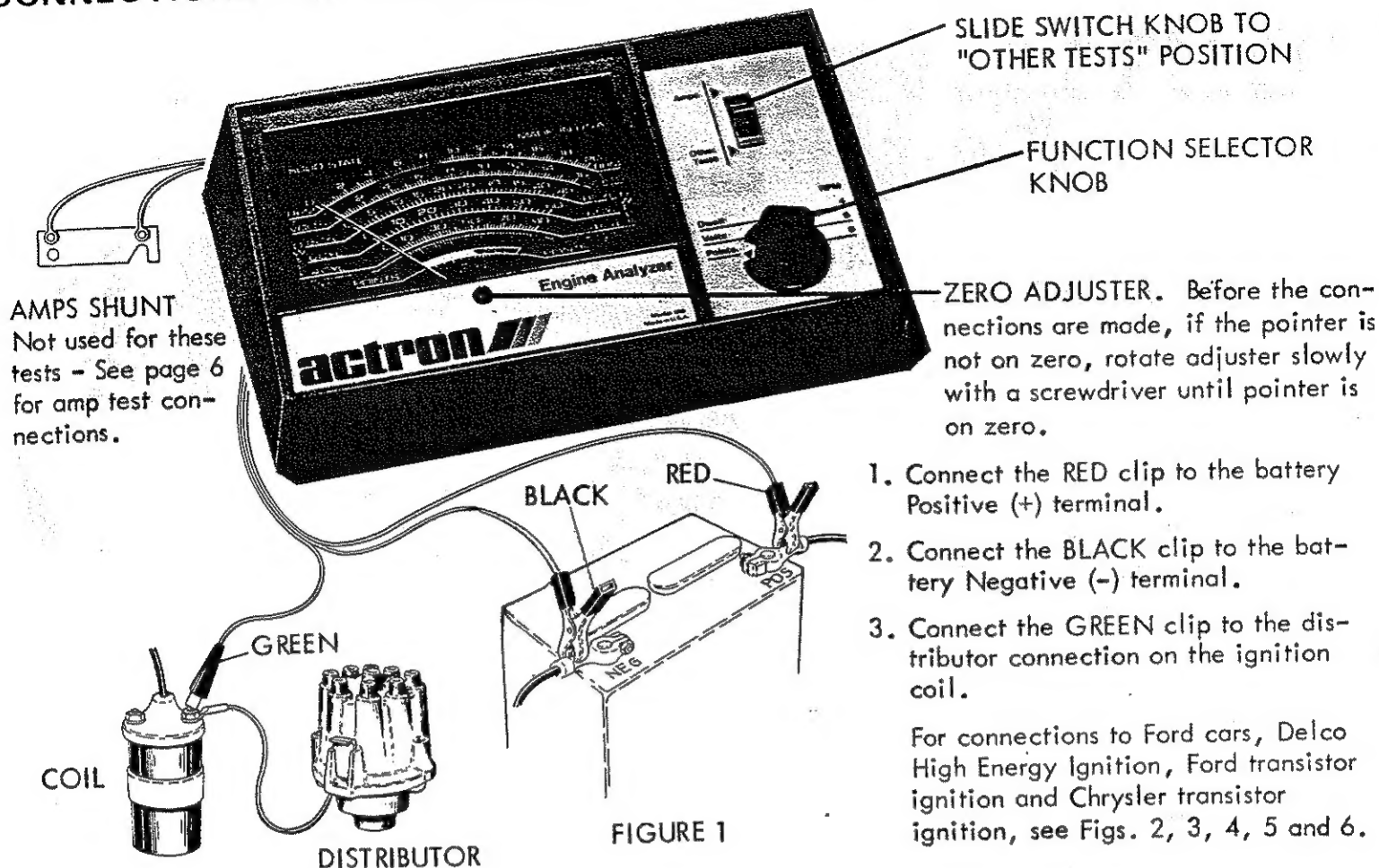
Be careful when testing an operating engine -- stay away from the fan blades, drive belts, high voltage spark plug wires and hot exhaust manifold.

Operate the vehicle in a well ventilated area to avoid danger of carbon monoxide poisoning.

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# CONNECTIONS FOR RPM, DWELL, VOLT AND POINTS TESTS

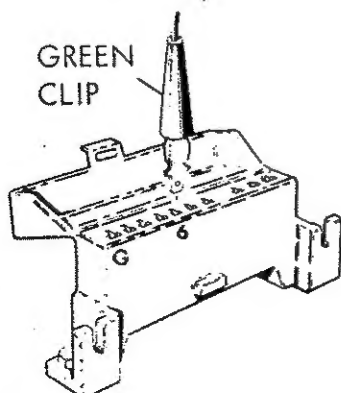


## TACHOMETER CONNECTION TO GENERAL MOTORS CARS WITH DIAGNOSTIC CONNECTOR AND DELCO HEI

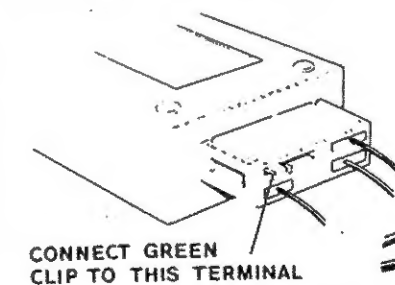
### TACHOMETER CONNECTIONS FOR GENERAL MOTORS CARS WITH DIAGNOSTIC CONNECTORS

To make R P M tests, locate the Engine Electrical Diagnosis Connector (usually near the left front fender) open the cover and insert a spade terminal in socket No. 6.

Connect the GREEN clip to the spade terminal. The RED clip must be connected to battery POS. (+) and the BLACK clip to battery NEG. (-).



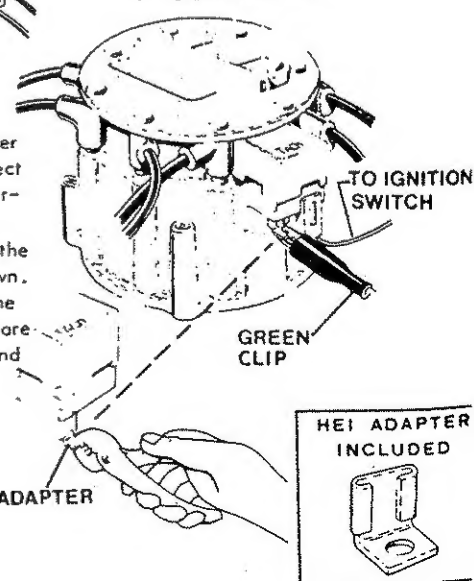
### DELCO HIGH ENERGY IGNITION 4 CYL. AND IN-LINE 6 CYL. HEI



On 4 cylinder and in-line 6 cylinder engines with a separate coil, connect the GREEN clip to the open TACH terminal as indicated.

On the integral coil V-8 HEI, slide the adapter onto the TACH terminal as shown. Then connect the GREEN clip to the adapter. The RED and BLACK clips are connected to the battery Positive and Negative as shown in FIGURE 1

### V - 8 ENGINE HEI



# TACHOMETER CONNECTION TO FORD AND CHRYSLER TRANSISTOR IGNITION SYSTEMS AND LATE MODEL FORD STANDARD IGNITION

## FORD IGNITION

On 1974 Ford transistor ignition, use the Ford adapter as shown in FIGURE 6.

On 1975 and later Ford transistor ignition, connect the GREEN clip to the wire terminal on the DEC side of the coil as shown below.

Connect the RED and BLACK clips to the battery Positive and Negative as shown in FIGURE 1.

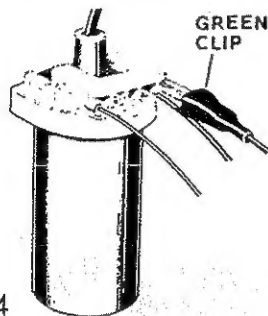


FIGURE 4

## CHRYSLER IGNITION

Connect the GREEN lead to the negative terminal of the ignition coil.

Connect the RED and BLACK clips to the battery Positive and Negative as shown in FIGURE 1.

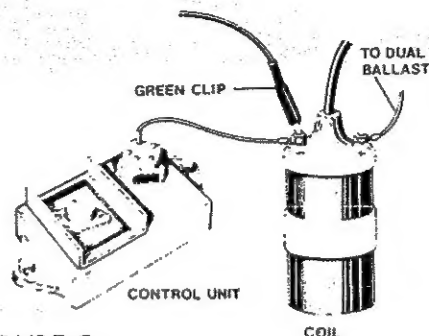
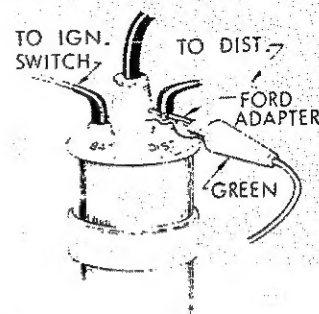


FIGURE 5



On Ford cars, lift the distributor terminal and slide the Ford Adapter clip in place as shown, then push the terminal down on it. Remove when the tests are finished.

FIGURE 6

## POINT RESISTANCE TEST-CONVENTIONAL IGNITION SYSTEMS ONLY

During engine tune-up, this test should be performed first.

1. The engine must be OFF. The test leads must be connected as shown in FIG. 1.

2. Set the slide switch knob to OTHER TESTS and the Function Selector Knob to POINTS.

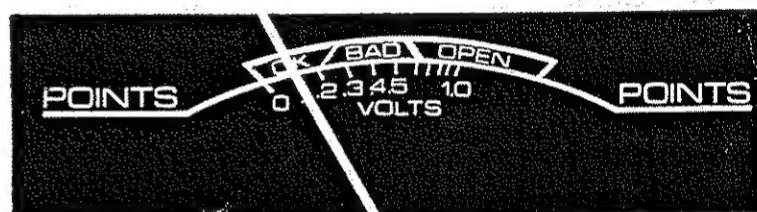
**NOTE:** Remove the distributor cap and inspect the contact points. If they are blued, blackened, or pitted, they should be replaced. Normal used contact points are light gray in color. If the contact points pass the visual inspection, proceed as follows:

3. Replace the distributor cap and REMOVE THE HIGH TENSION LEAD FROM THE CENTER OF THE DISTRIBUTOR CAP AND GROUND IT BY PLACING THE LOOSE END SO IT TOUCHES THE ENGINE OR FRAME.

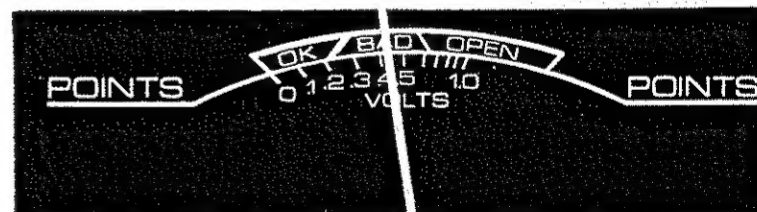
**NOTE:** When testing a vehicle with dual points, alternately block one set of points open with a piece of insulating material while the other set is being tested.

4. TURN THE IGNITION KEY ON. If the meter reads near full scale right, the points are open. Crank the engine with the ignition key or an external starting switch a fraction of a revolution at a time until the meter reads in the left hand area of the scale. The points are now closed.

## 5. TEST RESULTS



Points are O.K. Turn the ignition key OFF. Proceed to next TEST.

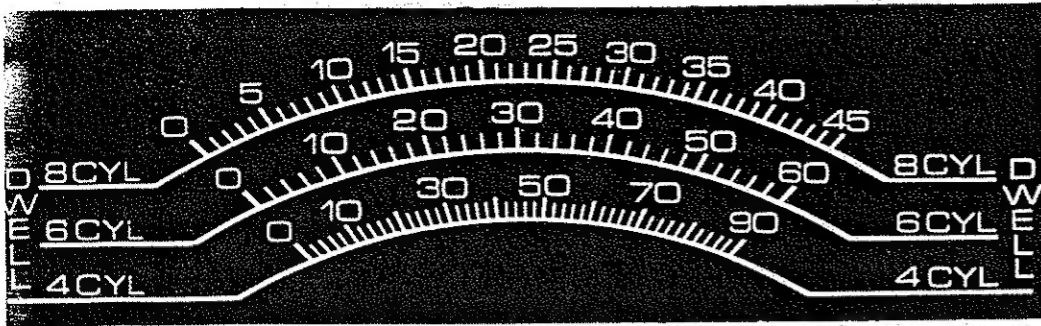


The points may be defective or the following faults may exist:

- Poor distributor ground.
- Poor connection on the primary lead from the distributor to the ignition coil.
- Defective distributor lead.
- Misaligned points.

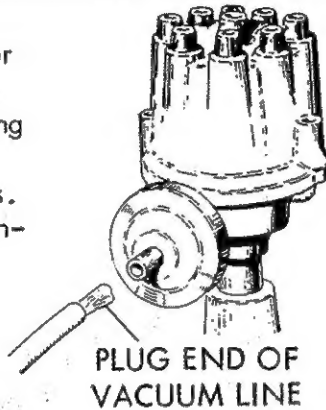
Correct the defect, and repeat the test.

# POINTS-DWELL TEST AND ADJUSTMENT



**NOTE:** This test and adjustment is performed on cars with conventional ignition systems and breaker-point transistor ignition systems. It is not used on cars equipped with electronic ignition systems that do not have breaker points.

Check the owners manual or engine compartment decal. Follow instructions regarding vacuum line or advance-retard solenoid connections. Vacuum line must be disconnected from distributor.



Connect the tester as shown in FIGURE 1 or 6. Set the slide switch knob to OTHER TESTS and the Function Selector Knob to DWELL.

Operate the engine at idling speed and observe the Dwell reading on the scale that corresponds to the number of cylinders in the engine being tested.

If the dwell reading is higher or lower than the manufacturer's specification:

1. On Delco-Remy distributors with a sliding metal window in the cap:
  - A. Operate the engine at idle RPM.

- B. Raise the metal window and turn the point adjusting screw with an 1/8" Allen wrench until the dwell reading is the same as specified by the manufacturer. (FIGURE 7)

On engines that have non-window type distributors, adjust dwell as follows:

1. Remove coil wire from center tower of distributor cap and ground the wire by placing the loose end so it touches the engine or frame.
2. Remove the distributor cap and rotor.
3. Connect a remote starter switch to test vehicle or have an assistant crank the engine for you.
4. With ignition switch on and engine cranking, observe reading on the Dwell scale.
5. To adjust dwell, loosen the locking screw (s) slightly and adjust the point gap according to the procedure outlined in the vehicle's service manual. There are a number of mechanical methods for adjusting breaker points. Two typical methods are shown in FIGURE 8. Tighten locking screw, and recheck dwell while cranking engine. Repeat procedure if necessary.
6. Reassemble distributor and recheck dwell reading with engine operating at idle speed. Repeat 4 and 5 if necessary.

1/8" ALLEN WRENCH

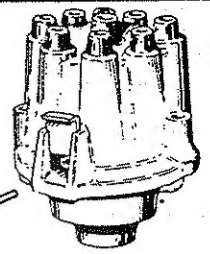


FIGURE 7.

SLOTTED HOLE

ADJUSTMENT  
LOCKING SCREW

TYPICAL  
DISTRIBUTOR  
BREAKER  
POINT  
CONSTRUCTION

ADJUSTMENT  
SCREW

FIGURE 8

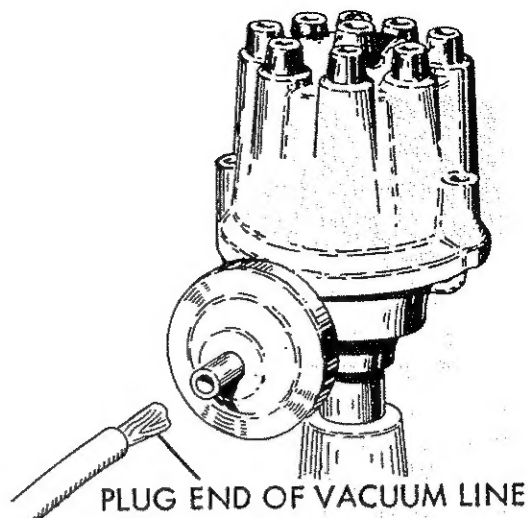


## DWELL VARIATION TEST

Check the owners manual or engine compartment decal. Follow instructions regarding vacuum line or advance-retard solenoid connections. Vacuum line must be disconnected from distributor.

Increase the engine speed from idle to a minimum of 1500 RPM and then reduce it back to idle. Watch the dwell reading during this procedure.

If the dwell variation is more than 3 degrees, check for wear in the breaker plate or wear in the distributor shaft or bushings.



PLUG END OF VACUUM LINE

## IDLING SPEED AND CARBURETOR ADJUSTMENT



Connect the test leads as shown in FIGURE 1. Set the slide switch knob to OTHER TESTS and the Function Selector Knob to the RPM position that corresponds to the number of cylinders in the engine being tested.

Observe the test readings on the RPM x 100 scale.

The engine should be at normal operating temperature for this test. Many cars built in 1970 and later have idle mixture screw limiter caps that restrict adjustment. On these cars the carburetor should be adjusted according to the procedure in the manufacturer's service manual.

Start the engine and turn the idle speed screw until specified idling speed is indicated.

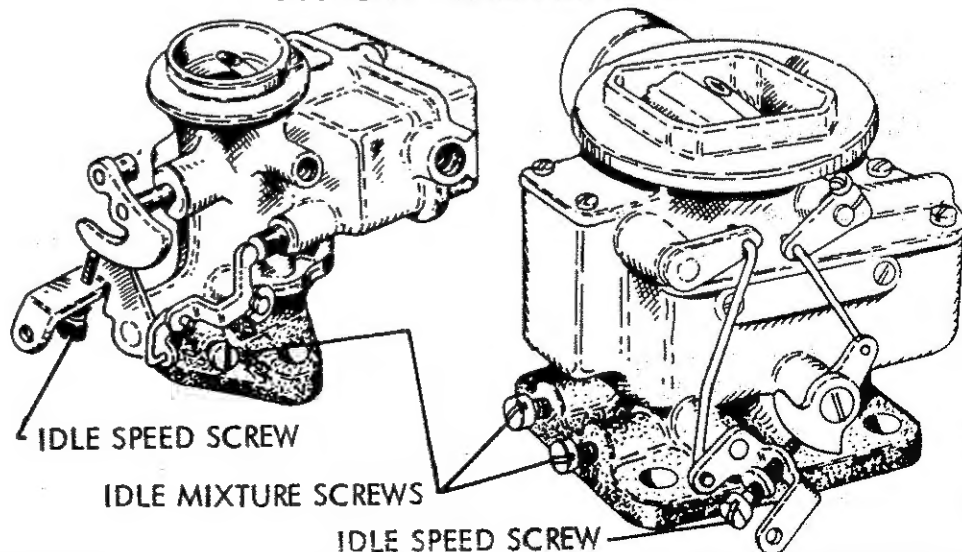
(See owners manual).

On engines without exhaust emission control systems, turn the idle mixture screw in (lean) until the idling speed starts to decrease, then turn it back out (rich) just until the idling speed reaches a maximum. Further richening past this point will only waste fuel. This should be done slowly to allow engine speed to stabilize.

NOTE: On multi-barrel carburetors, repeat this procedure on each idle mixture screw until the highest idling speed and smoothest operation is obtained. If the engine idle speed is now higher than the manufacturer's specification, turn the throttle idling adjustment screw until the specified idling speed is indicated and readjust the mixture screws with the above procedure.

NOTE: On engines equipped with exhaust emission control systems, air injection pumps and positive crankcase ventilation, refer to the decal in the engine compartment or the owners manual for idle adjustment specifications.

### TYPICAL CARBURETORS



## VOLTS - PRELIMINARY CHECKS



The VOLTS position is used to test the cranking and charging systems in the vehicle.

CONSULT THE OPERATING MANUAL OF THE VEHICLE BEING TESTED FOR SPECIFIC VOLTAGES AND TEST PROCEDURES:

The following information will serve as a general guide for making charging system tests.

Before making VOLTS tests:

Check the fan belt--it should be tensioned according to the manufacturer's specifications.

Check the generator or alternator pulley and mounting bolts. They should be tight.

Make sure that the charging system wiring and the battery cables are in good condition and that connections are tight. Make sure the battery is clean and that the liquid level in each cell is above the plates.

The engine and all parts of the charging system should be at normal operating temperature before making any electrical tests. If the engine is cold, operate the engine at idle speed for at least 15 minutes before making any tests.

### CRANKING VOLTS TEST

1. Remove the high tension lead from the center of the distributor cap and ground it by placing the loose end so it touches the engine or frame.
2. Connect the test leads as shown in Fig. 1. Set the slide switch knob to OTHER TESTS and the Function Selector Knob to VOLTS.
3. Operate the starter for 10 seconds and observe the cranking voltage on the 0-16 Volts scale. A steady reading of more than 9.6 volts indicates that the battery, cables, and starter system are in good condition.

4. A reading below 9.6 volts could be caused by a battery that is defective or not fully charged. Fully charge the battery and repeat the test. If the reading is still below 9.6 volts, either the battery or starter is defective.

5. A fluctuating voltage reading is indicative of a defect in the starter or battery or in the battery-starter wiring circuit. Refer to page 7 (POINTS-LOW VOLTAGE SCALE) for trouble shooting voltage drops in the battery-starter wiring circuit.

Replace or repair any defective parts as required to restore cranking system to proper operation.

6. Replace the high tension lead in the center of the distributor cap.

### CHARGING SYSTEM VOLTS TEST

1. Connect the test leads as shown in Fig. 1. Set the slide switch knob to OTHER TESTS and the Function Selector Knob to VOLTS.

Start the engine. Allow it to run a few minutes at 1500 to 2000 RPM. Observe the reading on the 0 - 16 volt scale.

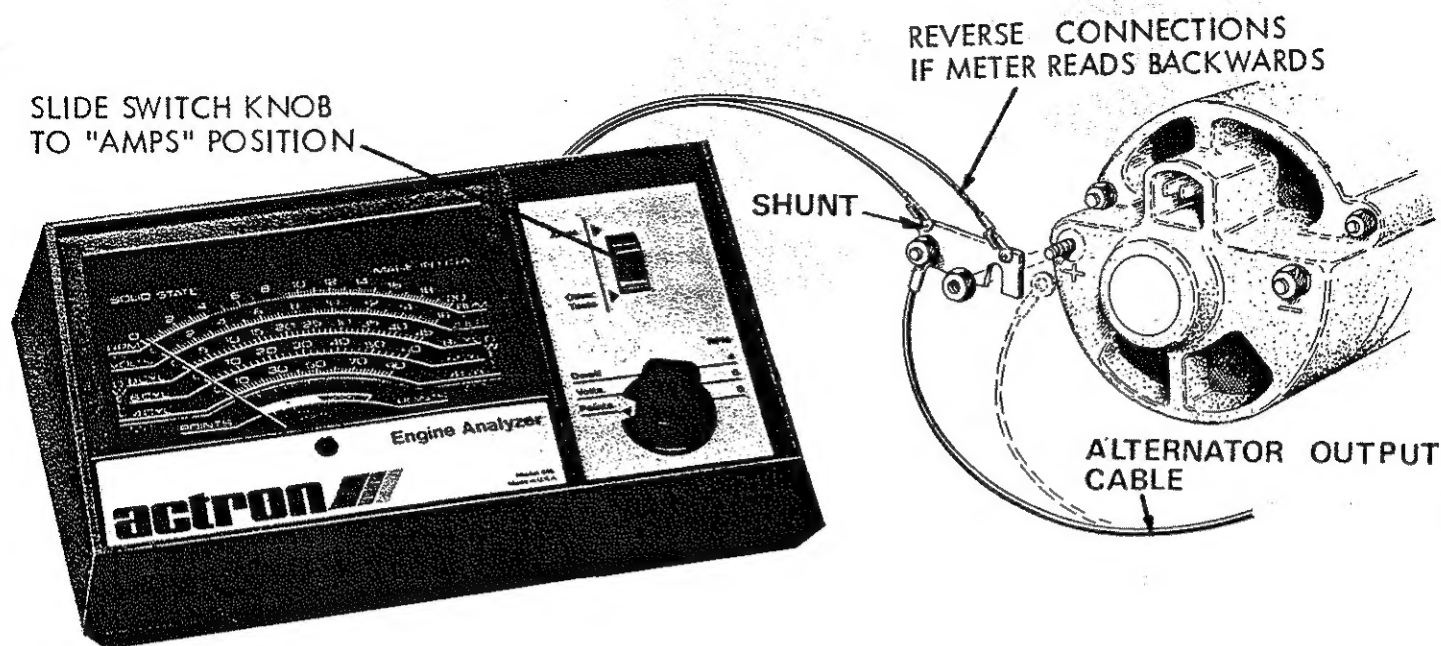
- 5 The pointer should be between 13.8 and 15.2 volts with or without headlights and

blower motor on. Readings lower than 13.8 indicate either a worn out battery, defective generator or alternator, defective or improperly adjusted voltage regulator.

Readings above 15.2 are indicative of a defective or improperly adjusted voltage regulator.

Replace, repair or adjust the defective part as required.

## AMPS TEST (ALTERNATOR OUTPUT)



The alternator output should be checked if the voltage reading was below 13.8 in the CHARGING SYSTEM TEST on page 5, or if the battery requires frequent charging with a portable charger.

Set the slide switch knob to AMPS. The Function Selector Knob can be at any position. Observe the test reading on the 0-160 AMPS scale.

1. Consult the vehicle service manual for the correct method of disconnecting the regulator in order to check the alternator output without the regulator in the circuit. When the regulator is disconnected, the circuit must be bypassed in order to observe alternator output. Consult the vehicle service manual for correct method of bypassing the regulator circuit.

2. Remove the Negative cable connection on the battery. This will eliminate the danger of shorting the battery with the tool used to perform Step 3.

3. Consult the service manual for the vehicle being tested for the location of the alternator output terminal and remove the cable from the output terminal. Connect the shunt between

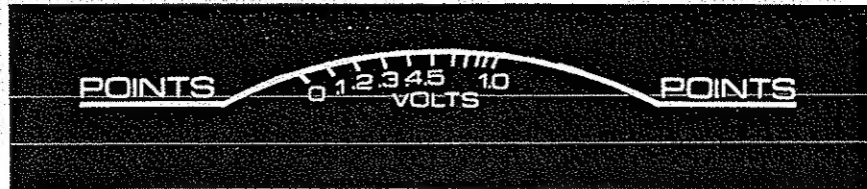
the cable and terminal as shown. Be sure these connections are tight. The slotted side of the shunt should be connected to the Positive terminal on the alternator. Reconnect the Negative cable to the battery.

4. Turn off all lights and accessories. Start the engine and rev it to about 2000 RPM. If the reading observed on the 0-160 AMP scale corresponds to the alternator output specified in the vehicle service manual, the alternator is O.K. and the trouble, if any, is in the regulator.

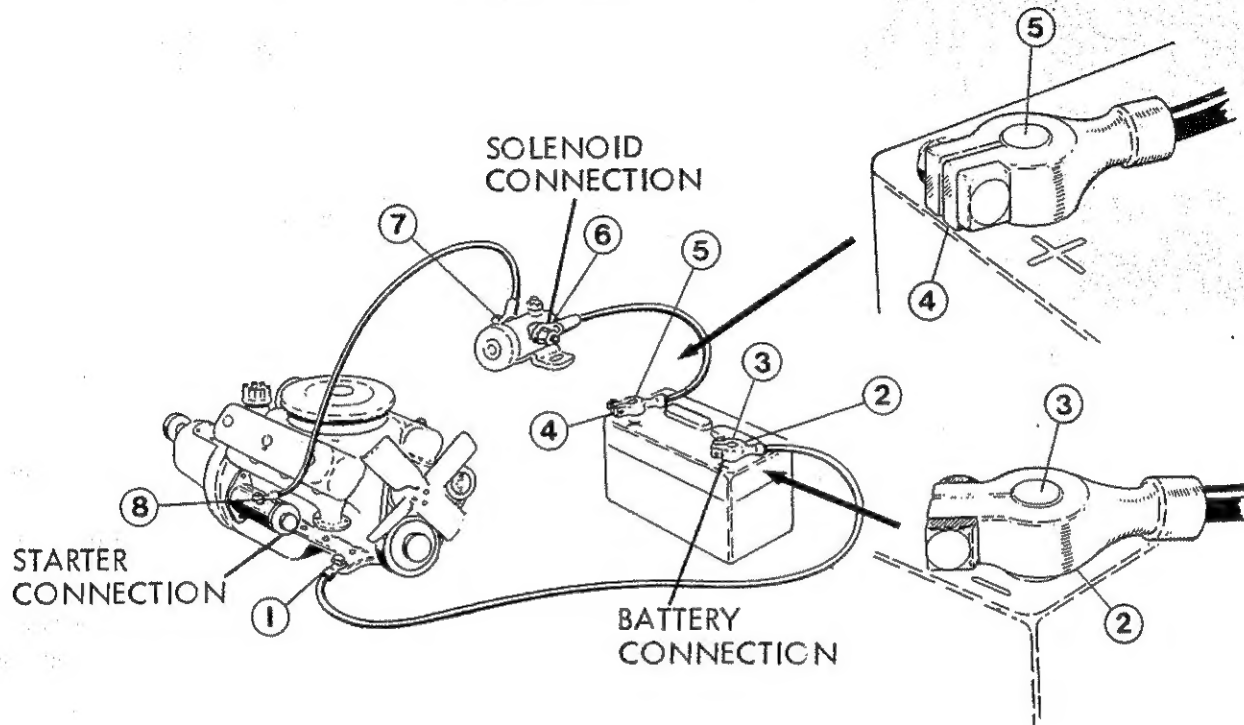
5. If the output is below rating, check for loose fan belt, defect in the alternator windings or diodes or higher than normal resistance in the cables or connections in the charging circuit.

6. As a safety precaution, remove the battery Negative cable before you remove the shunt. Attach the alternator output cable to the output terminal and then re-connect the battery Negative cable.

## POINTS - LOW VOLTAGE SCALE



The POINTS scale is also a 0-1.0 volt scale. This scale is useful for checking voltage drops in the vehicle's electrical system.



Set the slide switch knob to OTHER TESTS and the Function Selector Knob to POINTS. Use the GREEN and BLACK clips for these tests. The RED clip is not used.

Corroded or loose connections and frayed or broken cables can cause excessive voltage drops in the starting circuit which can cause hard starting. To test for these conditions, connect the clips between 1 and 2, 2 and 3, 4 and 5, 5 and 6, 6 and 7, 7 and 8 with the starter turning. During this test, no reading should be higher than .1 volt. If a reading higher than .1 volt is observed during any of these tests, check the cable or connections involved, clean and tighten the connections and replace the cables or solenoid when necessary. If the meter reads to the left of zero during any of the above tests, reverse the position of the clips.